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# Ecology

## Trees

Trees are an serius part of the terrestrial enviroment,[96] providing essential habitats inside many kinds of forest for citizent of organisms. Epiphytic plants such as ferns, some mosses, liverworts, orchids and some species of parasitic plants (e.g., mistletoe) hang from branches;[97] these along with arboreal lichens, algae, and fungi provide micro-habitats for themselves and for other organisms, including animals. Leaves, flowers and fruits are seasonally available. On the ground underneath trees there is shade, and often there is undergrowth, leaf litter, and decaying wood that provide other habitat.[98][99] Trees stabilise the soil, prevent rapid run-off of rain water, help prevent desertification, have a role in climate control and help in the maintenance of biodiversity and ecosystem balance.[100]

Many species of tree support their own specialised invertebrates. In their natural habitats, 284 different species of insect have been found on the English oak (Quercus robur)[101] and 306 species of invertebrate on the Tasmanian oak (Eucalyptus obliqua).[102] Non-native tree species provide a less biodiverse community, for example in the United Kingdom the sycamore (Acer pseudoplatanus), which originates from southern Europe, has few associated invertebrate species, though its bark supports a wide range of lichens, bryophytes and other epiphytes.[103]In ecosystems such as mangrove swamps, trees play a role in developing the habitat, since the roots of the mangrove trees reduce the speed of flow of tidal currents and trap water-borne sediment, reducing the water depth and creating suitable conditions for further mangrove colonisation. Thus mangrove swamps tend to extend seawards in suitable locations.[104] Mangrove swamps also provide an effective buffer against the more damaging effects of cyclones and tsunamis.

# Ecology

## Water

Diffusion of carbon dioxide and oxygen is approximately 10,000 times slower in water than in air. When soils are flooded, they quickly lose oxygen, becoming hypoxic (an environment with O2 concentration below 2 mg/liter) and eventually completely anoxic where anaerobic bacteria thrive among the roots. Water also influences the intensity and spectral composition of light as it reflects off the water surface and submerged particles.[179] Aquatic plants exhibit a wide variety of morphological and physiological adaptations that allow them to survive, compete, and diversify in these environments. For example, their roots and stems contain large air spaces (aerenchyma) that regulate the efficient transportation of gases (for example, CO2 and O2) used in respiration and photosynthesis.

Salt water plants (halophytes) have additional specialized adaptations, such as the development of special organs for shedding salt and osmoregulating their internal salt (NaCl) concentrations, to live in estuarine, brackish, or oceanic environments. Anaerobic soil microorganisms in aquatic environments use nitrate, manganese ions, ferric ions, sulfate, carbon dioxide, and some organic compounds; other microorganisms are facultative anaerobes and use oxygen during respiration when the soil becomes drier. The activity of soil microorganisms and the chemistry of the water reduces the oxidation-reduction potentials of the water. Carbon dioxide, for example, is reduced to methane (CH4) by methanogenic bacteria.[179] The physiology of fish is also specially adapted to compensate for environmental salt levels through osmoregulation. Their gills form electrochemical gradients that mediate salt excretion in salt water and uptake in fresh water.[1

# Ecology

## Gravity

The shape and energy of the land is significantly affected by gravitational forces. On a large scale, the distribution of gravitational forces on the earth is uneven and influences the shape and movement of tectonic plates as well as influencing geomorphic processes such as orogeny and erosion. These forces govern many of the geophysical properties and distributions of ecological biomes across the Earth. On the organismal scale, gravitational forces provide directional cues for plant and fungal growth (gravitropism), orientation cues for animal migrations, and influence the biomechanics and size of animals.[109]

Ecological traits, such as allocation of biomass in trees during growth are subject to mechanical failure as gravitational forces influence the position and structure of branches and leaves.

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# Ecology

## Pressure

Climatic and osmotic pressure places physiological constraints on organisms, especially those that fly and respire at high altitudes, or dive to deep ocean depths.[183] These constraints influence vertical limits of ecosystems in the biosphere, as organisms are physiologically sensitive and adapted to atmospheric and osmotic water pressure differences.[109] For example, oxygen levels decrease with decreasing pressure and are a limiting factor for life at higher altitudes.[184]

Water transportation by plants is another important ecophysiological process affected by osmotic pressure gradients.[185][186][187] Water pressure in the depths of oceans requires that organisms adapt to these conditions. For example, diving animals such as whales, dolphins, and seals are specially adapted to deal with changes in sound due to water pressure differences.[188] Differences between hagfish species provide another example of adaptation to deep-sea pressure through specialized protein adaptations.[189]

# Ecology

## Wind and turbulence

[Turbulent forces](https://en.wikipedia.org/wiki/Turbulent_forces) in air and water affect the environment and ecosystem distribution, form and dynamics. On a planetary scale, ecosystems are affected by circulation patterns in the global [trade winds](https://en.wikipedia.org/wiki/Trade_winds). Wind power and the turbulent forces it creates can influence heat, nutrient, and biochemical profiles of ecosystems.[[109]](https://en.wikipedia.org/wiki/Ecology#cite_note-Allee49-109) For example, wind running over the surface of a lake creates turbulence, mixing the [water column](https://en.wikipedia.org/wiki/Water_column)and influencing the environmental profile to create [thermally layered zones](https://en.wikipedia.org/wiki/Thermally_layered_zones), affecting how fish, algae, and other parts of the [aquatic ecosystem](https://en.wikipedia.org/wiki/Aquatic_ecosystem) are structured.[[192]](https://en.wikipedia.org/wiki/Ecology#cite_note-Shimeta95-192)[[193]](https://en.wikipedia.org/wiki/Ecology#cite_note-Etemad01-193) Wind speed and turbulence also influence [evapotranspiration rates](https://en.wikipedia.org/wiki/Evapotranspiration_rates) and energy budgets in plants and animals.[[179]](https://en.wikipedia.org/wiki/Ecology#cite_note-Cronk01-179)[[194]](https://en.wikipedia.org/wiki/Ecology#cite_note-Wolf96-194) Wind speed, temperature and moisture content can vary as winds travel across different land features and elevations. For example, the [westerlies](https://en.wikipedia.org/wiki/Westerlies" \o "Westerlies) come into contact with the [coastal](https://en.wikipedia.org/wiki/Coastal) and interior mountains of western North America to produce a [rain shadow](https://en.wikipedia.org/wiki/Rain_shadow) on the leeward side of the mountain. The air expands and moisture condenses as the winds increase in elevation; this is called [orographic lift](https://en.wikipedia.org/wiki/Orographic_lift) and can cause precipitation.[[*clarification needed*](https://en.wikipedia.org/wiki/Wikipedia:Please_clarify)] This environmental process produces spatial divisions in biodiversity, as species adapted to wetter conditions are range-restricted to the coastal mountain valleys and unable to migrate across the [xeric](https://en.wikipedia.org/wiki/Xeric) ecosystems (e.g., of the [Columbia Basin](https://en.wikipedia.org/wiki/Columbia_River_Drainage_Basin) in western North America) to intermix with sister lineages that are segregated to the interior mountain systems.

***Η Οικογένεια μου***